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Status of K-12 Education in California at a Time of Fiscal Crisis: Preliminary Results

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About This Report

The American Institutes for Research (AIR) is conducting and funding an analysis of the impact of the fiscal crisis on K-12 education in California as part of our effort to provide relevant research for decision makers in the state and as a resource for those in other states dealing with similar constraints on public resources. This interim report contains preliminary findings on our research.

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Preliminary Results

The worldwide economic decline in 2008 hit many states hard, and had an especially strong impact on California and its public education system. The purpose of this report is to develop and present baseline information regarding K-12 public education in California prior to this fiscal crisis.

While we expect the fiscal crisis to affect the amount of resources that California makes available for public education, it is also important in constructing this baseline to consider more carefully where California fits in relation to other states in regard to education performance. A first look at the data indicates that prior to 2008 California was below the median in spending per student, and one of the lowest-performing states in regard to student outcomes, based on the National Assessment of Educational Progress (NAEP). In addition to being one of the lowest spending states, California has perhaps the most challenging students in the nation. For example, nearly one-third of all public school students in the state are English learners, compared to 19 percent for the next closest state (Nevada) and a national average of 9 percent.[1]

This report asks, given the resources available to public education and the composition of the students served, how does California compare with other states as we enter into this period of economic decline? In short, we argue that considering where California's K-12 education system fits in relation to the nation is considerably more complex than simple comparisons of nominal spending and test scores. Media reports often rely very heavily on such data to draw strong conclusions. For example, the *Economist* recently described California public schools as being "with some exceptions, awful" ("From Bad to Worse," 2010). Our analysis suggests that this

1 These figures are based on the 2007 reading grade 4 National Assessment of Education Progress public school sample.

characterization of California public education is overly simplistic.

The following sections present alternative ways of comparing the California K-12 school system to the nation prior to the fiscal crisis. First, we provide comparisons of the education resources and outcomes for California schools compared to other states, both in terms of raw data and adjusted for varying student demographics and levels of purchasing power in each state.

Second, we turn to analyses within California to examine cost-adjusted inputs as compared to need-adjusted student outcomes in unified school districts. These analyses were initially developed to support district sample selection for the component of this project documenting district experiences of the fiscal crisis and their future plans. We were selecting districts to interview that were higher- and lower-performing in relation to the resources available to them to determine how the fiscal crisis might be affecting them differently.

National Comparisons

In this section, we look at national data on the states. These data show what California was investing in and getting from its education system prior to the crisis, and how this compares to other states. We examine spending per student, staffing levels, and the state's student achievement compared with other states. Looking at education resource inputs and student achievement outputs together, we examine how California's education achievement compares with other states investing similar resources. Similarly, we compare California's level of expenditures with those of other states with comparable achievement.

Per Pupil Spending

As Figure 1 shows, in the 2006-07 school year, California ranked 29th in the nation in what the state spent per pupil (in nominal dollars, out of 50 states and the District of Columbia).[2] Compared to the national average of $9,683 per pupil less, California was spending $731 per pupil, or 7.5 percent less. From the 1996-97 school year on, California's rank in the nation fluctuated, from as low as 35th to as high as 25th (small changes can lead to wide variation in rankings when states are clustered together fairly closely). In general, over the past ten years California was generally below the median, but not among the lowest in the nation. While this brief focuses on 2006-07 and the ten preceding years, recently released data place California at 41st in spending in the 2007-08 school year (National Education Association, 2009)

2 Our rankings are out of 51 as we include the 50 states and the District of Columbia. We calculated this from the Common Core of Data (CCD) State Fiscal Files for the school years 1996-97 to 2006-07, using the CCD's current expenditures figure as our numerator and 2007 membership (the count of students on roll taken on the school day closest to October 1, 2007) as the denominator.

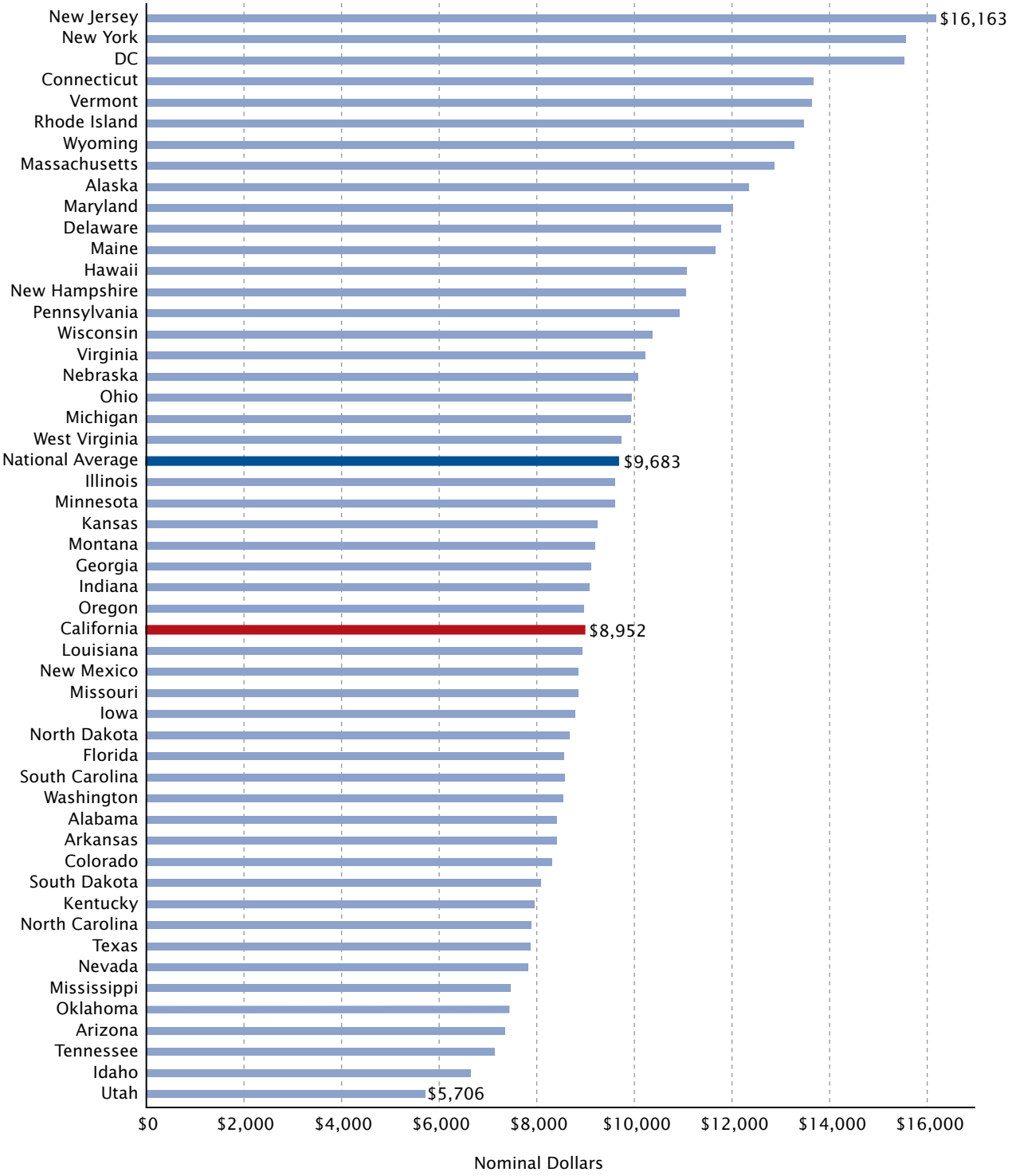
and project California to be 46th in the 2009-10 school year (UCLA/IDEA, as cited in Edweek, 2010).

However, these rankings are in nominal, unadjusted dollars. Because the cost of labor varies across states, higher school spending per pupil may simply reflect differences in the costs of labor rather than any real differences in access to educational services. To adjust for such cost differences, the National Center of Education Statistics has developed a comparable wage index (CWI) that provides a measure of differing labor costs across states.[3] The CWI allows us to adjust nominal expenditures per pupil for differences in cost both across states and across time in an attempt to provide a more accurate picture of states' relative education buying power.[4]

Wages in California tend to be higher than those in many other states. For instance, California teachers were the highest paid in the nation in 2007-08 (National Education Association, 2009). Therefore, in cost-adjusted dollars, California ranks much lower in expenditures per pupil than when ranked with unadjusted dollars. As Figure 2 shows, in 2006-07 California ranked 46th in cost-adjusted expenditures per pupil, spending over $1,400 per student (or 16.6 percent) below the national average. These cost-adjusted figures provide an estimate of the *real* differences in educational services across states. In contrast to California's fluctuating unadjusted ranking, California's ranking in cost-adjusted expenditures per pupil was consistently very low over the same ten years, hovering at between 46th and 48th.

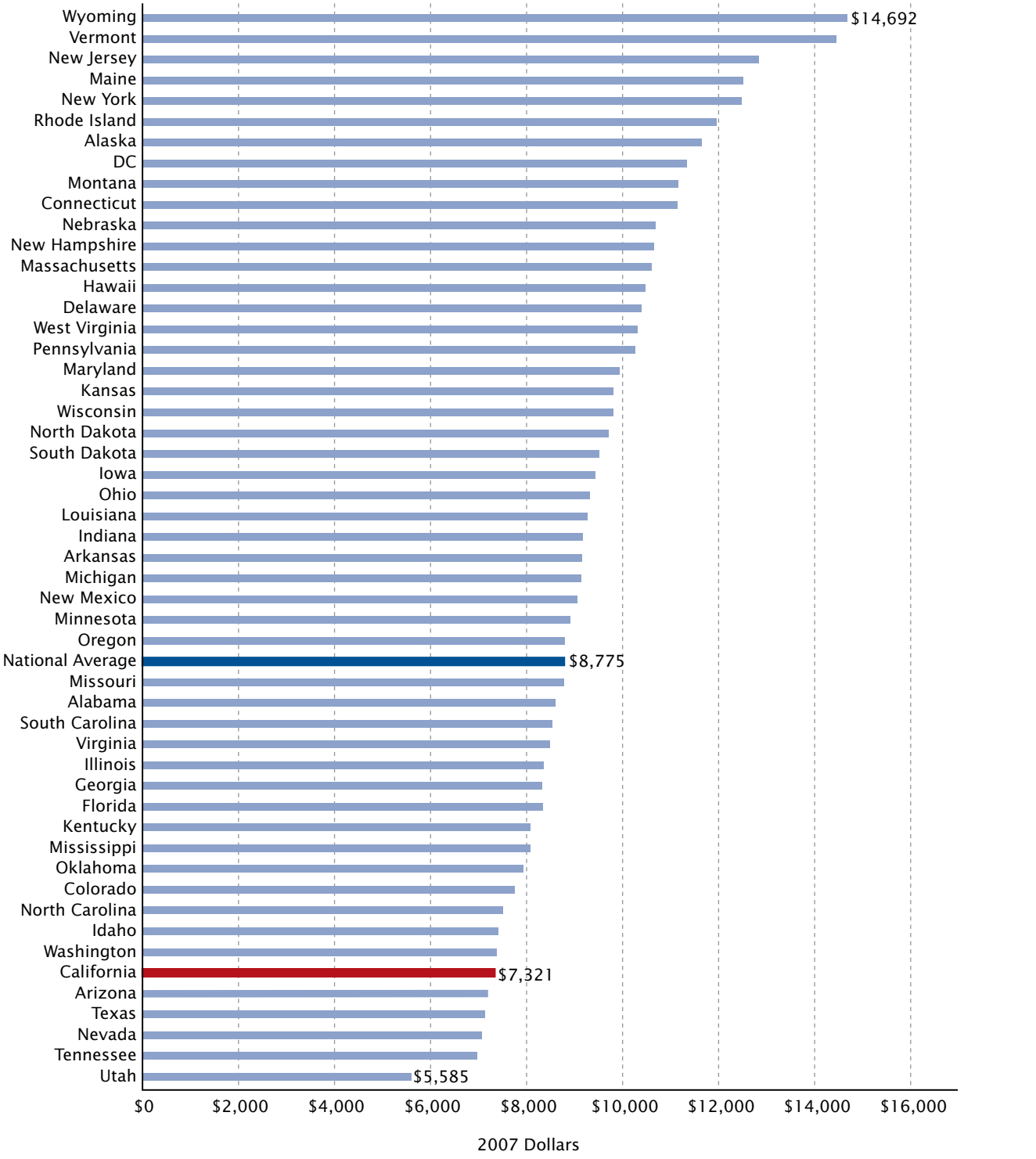
3 The index is based on the wages of non-teacher, college-graduate, adults in states and districts (Taylor, et al., 2007).
4 The CWI ends with the 2004-05 school year. For subsequent years, we inflated the 2004-05 CWI numbers using the consumer price index (CPI).

Figure 1. Nominal expenditures per pupil by state, 2006-07 school year



SOURCE: Common Core of Data (CCD), the National Public Education Financial Survey Data, 2006-2007

Figure 2. Cost-adjusted expenditures per pupil by state, 2006-07 school year (in 2007 dollars)



SOURCE: Common Core of Data (CCD), the National Public Education Financial Survey Data, 2006-2007. NCES Comparable Wage Index (CWI), 2005

Note: CWI's base year is 2000. The CPI was used to inflate numbers to 2007 dollars. CPI growth, however, was slower than national growth over the time period so the 2006-07 national average in adjusted terms and 2007 dollars is lower than the 2006-07 national average in unadjusted terms.

Staffing Levels

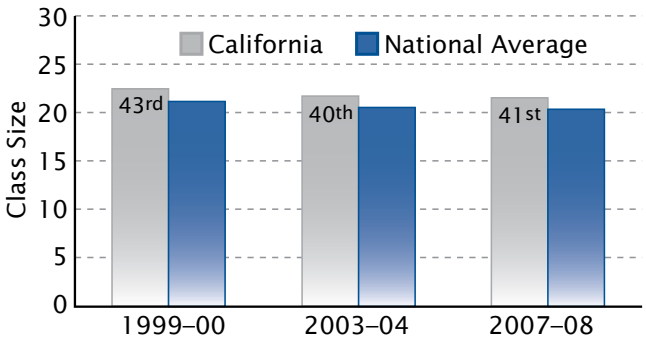
In addition to looking at what California spends per student compared to other states, we also consider non-monetary inputs, specifically staffing ratios and class size.[5] The data largely confirm what we observe in the cost-adjusted expenditures per pupil: California ranks near the bottom.

Prior to the current fiscal crisis, California ranked second to last in the number of pupils per certified staff (which includes teachers, administrators, support staff, guidance counselors/directors, and librarians). This translates, in 2006-07, to California having approximately 17.7 students per certified staff member, which was 4.5 students more than the national average. We combined these categories of staff to provide a more consistent measure across states, given that an employee classified as support staff in one state might be classified as an administrator in another state.

Looking at average class size, we find that the story for California is more nuanced. While California's average elementary class size is not very different from the national average, California ranks at the bottom for secondary class size. In elementary classes, while California ranked 41st in 2007-08, the state only had 1.3 more students than the national average (see Figure 3). While the difference is not large, it is notable that California still ranks poorly despite a class size reduction initiative enacted in 1996 to reduce class sizes at the elementary level. In secondary classes, California ranked 51st; in 2007-08 the state had 6.6 more students per class than the national average (see Figure 4).

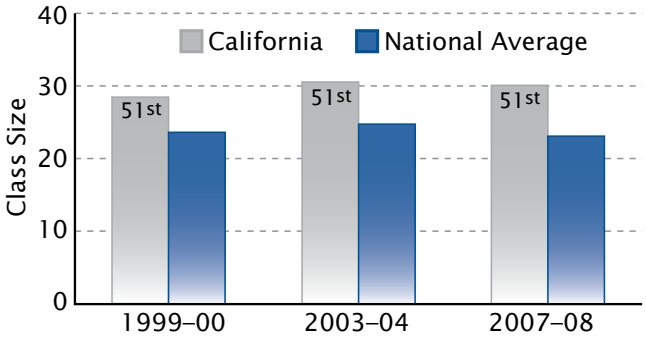
5 Data on staffing ratios come from the Common Core of Data state non-fiscal files from 1996-97 to 2006-07. Data on class size come from the School and Staffing Survey for the 2000-01, 2003-04, and 2006-07 school years.

Figure 3. Class size in elementary self-contained classrooms, California and national averages, 1999-2000, 2003-04, and 2007-08 school years



SOURCE: U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey (SASS), Public School Teacher Data File.

Figure 4. Class size in secondary departmentalized classrooms, California and national averages, 1999-2000, 2003-04, and 2007-08 school years



SOURCE: U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey (SASS), Public School Teacher Data File.

In summary, prior to the budget cuts resulting from the recession, California students were at the bottom of the nation in terms of access to *real* K-12 public education resources. While nominal spending per student was in the middle, California was almost last in cost-adjusted dollars. This finding was echoed when we looked at some of those real inputs. California's students had access to fewer certified staff and sat in larger classes than students in most states in the country. In short, prior to the fiscal crisis, the state was not just spending less than many others but was also providing students with fewer staff supports at the core of education delivery—the school and the classroom.

Achievement

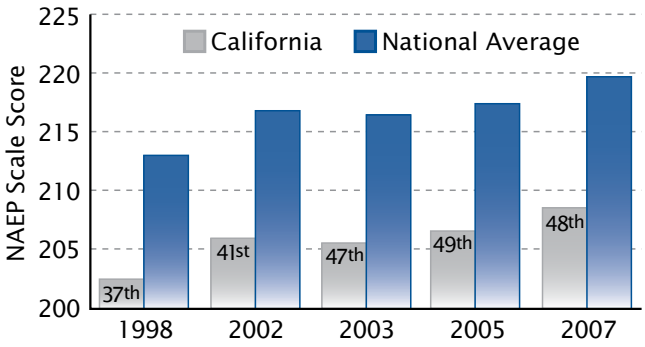
Of even greater importance is how the state fares in regard to student outcomes. For this, we turn to the National Assessment of Educational Progress (NAEP), the only nationally representative assessment that allows direct comparisons of achievement across states. In this brief, we focus on the results of the 4th grade reading assessment to simplify the presentation. However, these results were consistent for California across both subjects (reading and mathematics) and for both grades 4 and 8.

From 1998 to 2007, California students consistently scored low relative to students in other states on NAEP 4th grade reading (see Figure 5). While California ranked as high as 37th in 1998, the state has scored near the bottom since 2003, and was ranked 48th in 2007.[6]

Raw scale scores, however, do not account for differences in student characteristics across states. Certain types of students, such as English learners, face additional challenges on English language achievement tests. Accordingly, researchers often control for these characteristics when comparing scores. For example, comparing NAEP results between California (where 32 percent of all students are English learners) and North Dakota (with 1 percent English learners) may not provide a fair comparison of the relative effectiveness of these two state's education systems.

6 NAEP is administered from January through March in the year noted; therefore, the 2007 NAEP administration corresponds to the 2006-07 school year.

Figure 5. NAEP reading grade 4 scale score, California and national averages, 1998, 2000, 2003, 2005, and 2007

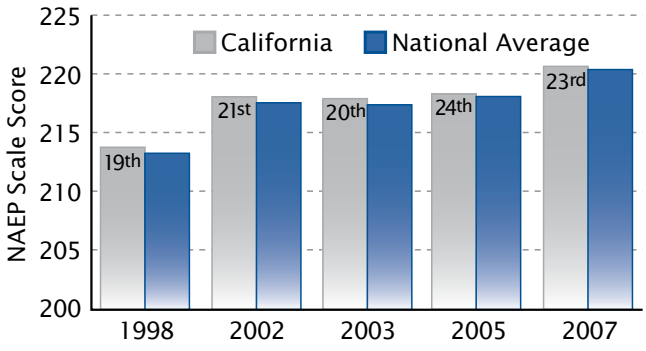


Source: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1998, 2002, 2003, 2005, and 2007 Reading Assessments.

Indeed, California has a larger percentage of K-12 English learners than any other state by far, with the next closest state being Nevada at 19 percent, and the national average at 9 percent. California also has one of the highest rates of students in poverty in the nation, at 53 percent, compared to the national average of 45 percent.[7]

Thus, in addition to straight comparisons of achievement data, we also present need-adjusted outcome data to control for some common demographic indicators that are correlated with achievement, including the percentage of students who are eligible for free or reduced-price lunch (an indicator of poverty), the percentage of students with disabilities, and the percentage of students who are English language learners; and percentage breakdowns by race/ethnicity.[8] After adjusting for these demographic differences across states, California ranks much higher in achievement (see Figure 6). Though California's ranking in need-adjusted achievement dropped from 19th in 1998 to 23rd in 2007, the state ranked above the median and scored above the average in all years analyzed.

Figure 6. Adjusted NAEP reading grade 4 scale score, California and national averages, 1998, 2000, 2003, 2005, and 2007



Source: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1998, 2002, 2003, 2005, and 2007 Reading Assessments.

7 Figures on English learners are taken from the U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2007 grade 4 Reading Assessment.

8 These are state-level analyses. In follow-up work, we intend to use individual-level NAEP data and more advanced models to provide better control for differing demographics across states.

Comparing Both Inputs and Outputs

Now that we have examined both the resources going into the education system and the educational outcomes emerging from the system, we want to consider these two measures together. We want to know if states that put similar resources into their education system get similar outcomes. Similarly, we want to know whether, for the same level of achievement as California, other states are spending more or less. (These analyses do not focus on whether the state is spending an adequate amount on public education, but on what is being produced in light of what is going into the system.)

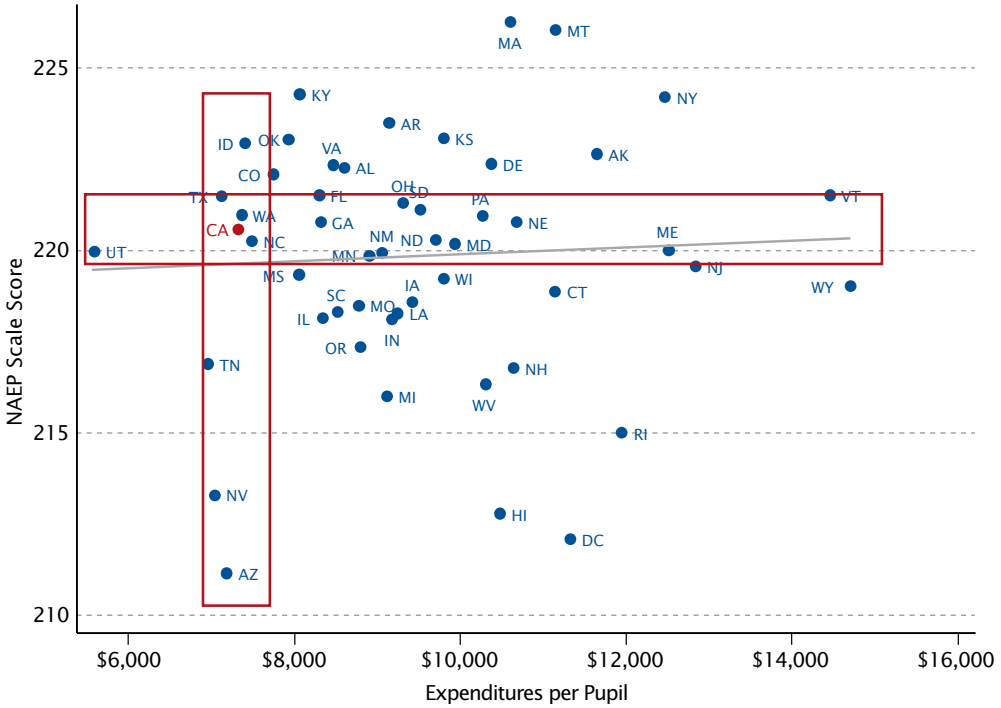
To this end, we have developed one possible approach for considering how California appears relative to other states in the provision of K-12 public education: We plot achievement and inputs together to examine where California falls.

We look first at unadjusted numbers (Figure 7). As shown above, in unadjusted terms California ranked toward the middle in expenditures per pupil in 2006-07, and near the bottom in achievement. Therefore, it is not surprising that here we find that 1) a number of states spend the same amount as California and achieve much more (e.g., North Dakota and Florida),

Figure 7. Achievement and expenditures using unadjusted measures: expenditures per pupil 2006-07 and NAEP reading grade 4 scale scores for 2007, by state

Source: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2007 Reading Assessment.

Figure 8. Achievement and expenditures using adjusted measures: cost-adjusted expenditures per pupil 2006-07 and need-adjusted NAEP reading grade 4 scores for 2007, by state by state



Source: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2007 Reading Assessment.

and 2) only a few states with similar achievement spend the same or less (e.g., Arizona and Mississippi).

However, the picture looks substantially different when using cost-adjusted expenditures per pupil and NAEP scores as adjusted for varying student characteristics. There are a few states that have higher adjusted achievement with similar or fewer resources (e.g., Texas and Idaho), and there are a number of states with similar resources that show lower outcomes (e.g., Tennessee, Nevada, and Arizona). All of the states with achievement similar to California have greater resources, with the possible exception of Utah, whose adjusted NAEP score is slightly lower but whose adjusted expenditure per pupil is much lower. Furthermore, some states with comparable adjusted achievement spend a lot more (e.g., Maryland, Nebraska, and Maine).

In short, while in unadjusted terms California looks like it has substantial room for improvement in 2007 (prior to the recession), this is less apparent when using adjusted measures.[9] Using adjusted numbers, our exercise suggests that the current financial crisis may have an especially large impact on California's educational system.

9 Similar analyses examining California's position of relative efficiency in 2003 result in similar findings.

California Districts

In addition to understanding where California stands in relation to other states prior to the recession, the concept of getting the most out of each educational dollar within California is also important. California districts are similarly faced with the pressure for continuing improvement in student achievement even as resources decline. For a district that is already producing at a very high level given the resources available, this may be an especially difficult task. Therefore, we extend our analysis to generate a picture of which districts in California appear to have relatively high achievement at relatively low costs and which do not.

Our study's analysis is an attempt to examine fiscal inputs as they relate to test score outputs and to develop a method for combining them into a single measure identifying districts that have student need-adjusted achievement greater than expected given the cost-adjusted level of available resources. In future work on this topic, we plan to further explore the application of complex statistical techniques.[10] Here, however, we employ a more straightforward methodology. Our goal is to produce a sample of districts of varying levels of achievement relative to input resources. This sample will later be used to capture variation in the effects of the fiscal crisis.

Constructing a District-Level Outcome-Expenditure Index

Our outcome-expenditure index has two components: expenditures per pupil derived from California's Standardized Accounting Code Structure (SACS), and academic achievement as measured by the California Standardized Test (CST). We use data from the four most recent school years available: from the 2004-05 school year to 2007-08. To allow for fair comparisons, we limit the analysis presented in this report to unified school districts, which serve over 70 percent of the state's students.[11]

10 Stochastic frontier analysis and data envelopment analysis are two methodologies for estimating frontiers.
11 EdData. (http://www.ed-data.k12.ca.us/)

The expenditure per pupil measure is defined as the total district expenditure divided by total enrollment. The expenditure data include district spending from all funds.[12] This measure includes such major categories of spending as personnel salaries, employee benefits, books and supplies, district services and operations, and capital outlay.[13] We deducted the following categories from total district expenditures to avoid double-counting expenditures that are accounted for elsewhere: (1) tuition; (2) transfers to other districts; (3) transfers to charters in lieu of property taxes; (4) inter-fund transfers; and (5) transfers to county offices of education.[14] Because costs vary across districts and across time, we adjust expenditures per pupil using the Comparable Wage Index (CWI), similar to the method used in examining the cross-state comparisons of expenditures per pupil.[15]

Academic achievement is measured using scores from the English-Language Arts (ELA) and math CST. First, to take into account school-level characteristics that measure the differing needs of a district's students, we constructed a district measure of academic achievement, controlling for school-level characteristics (i.e., minority subgroups, English learners, students with disabilities, and students eligible for free or reduced-price lunch). This district achievement measure indicates the degree to which the schools in a particular district are collectively performing above or below the predicted level given the characteristics of the students they serve.[16]

We then constructed an outcome-expenditure index to compare a district's achievement to the resources available to produce that achievement level. The index for every district combines the distance in actual performance in relation to predicted performance (measured in standard deviations) and actual spending in relation to the average (also measured in standard deviations). An outcome-expenditure index is generated separately for each year, and then for these analysis combined into a four-year average. This reduces the impact of one-year aberrations and helps identify districts that truly stand out.

12 Some may argue that expenditures per pupil should only take into account district spending from the General Fund Past research, however, has determined that the General Fund only accounts for approximately 70 percent of all district spending (Loeb et al., 2006). As a result, we decided to include spending from all funds, so as to obtain a more accurate picture of the full variation in spending across districts. For this, we used SACS object codes 1000-7999. For the total district enrollment, we used the School Information Form from the California Basic Educational Data System (CBEDS).

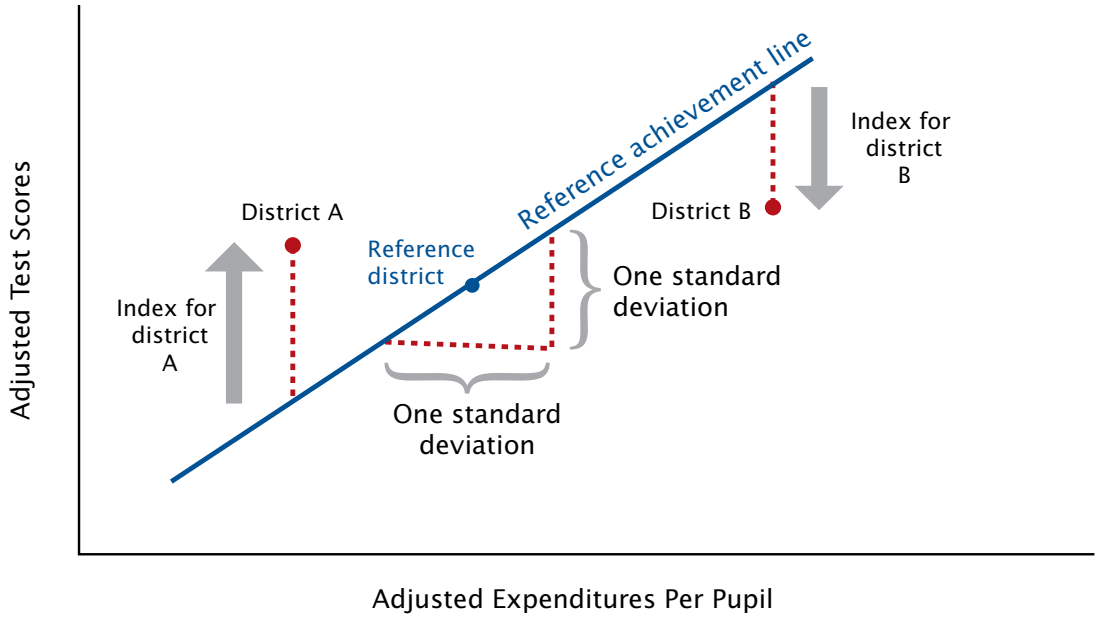
13 Including capital outlay can cause spikes in spending for some districts, as some districts may invest in large capital costs in one year. However, one could argue that capital expenditures are an important input into students' education, as large capital expenses such as buildings can affect a student's learning environment. In order to avoid the issue or one-time capital expenditures that might skew a district's expenditure per pupil amount, we use a four-year average to smooth the effects of spikes due to capital outlays.

14 We use the specification for total funds used in Loeb et al. (2006).

15 The CWI contains both time and location components so it can be used to control both for differences across districts in costs and inflation. As discussed above, the index was not updated past the 2005-06 school year. We use the consumer price index to inflate the index past the 2005-06 school year.

16 The process of calculating the VAI requires several steps. First, because CST scores are not vertically equated and are not comparable across grades, the scores are standardized within grade and year, before being added together to produce school scores. Next, a school-level regression analysis is performed to adjust for school-level characteristics. In these analyses, a district indicator is included to measure the difference between districts' actual and expected achievement. Finally, we average the district ELA and the math CST and then create a four-year average to create the overall academic index for a district.

Figure 9. Illustration of the Outcome-Expenditure Index

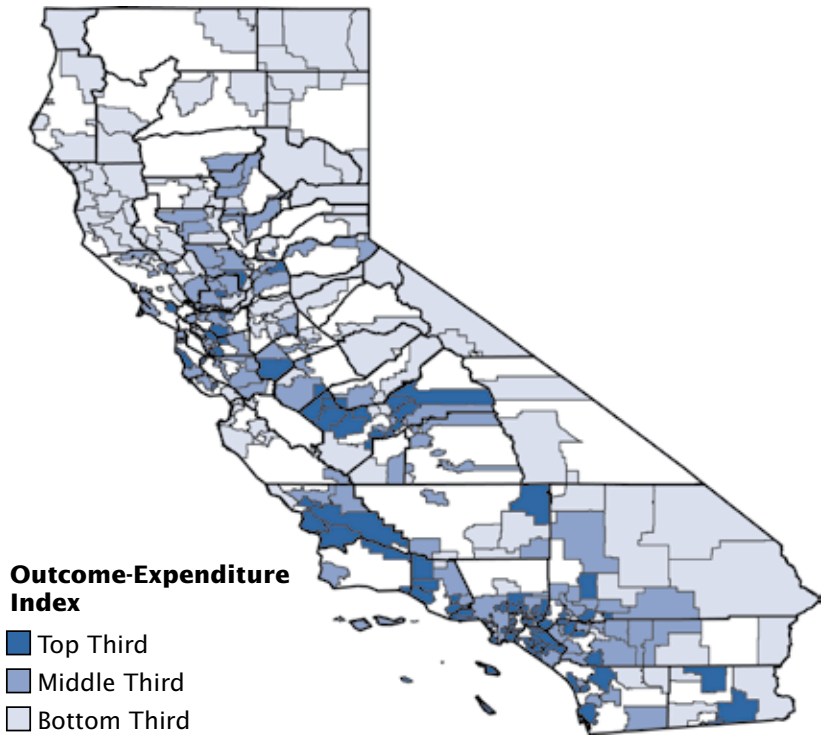


As shown in Figure 9, the reference point for our index is a hypothetical district with average cost-adjusted expenditures per pupil and average need-adjusted test scores. From this point, we create a "reference achievement line," where if a district shows an expenditure that is one standard deviation above the average then that district is also expected to have achievement that is one standard deviation higher. This creates a line hypothesizing the test score for each level of expenditure. We set the index of the reference point, and all points on the reference line, to zero. The outcome-expenditure index number for a district is equal to the vertical distance of that district to the reference line. For instance, if a district has need-adjusted test scores above the reference line (District A in Figure 9), the index will be positive. If a district has cost-adjusted test scores below the reference line (District B in Figure 9), the index will be negative.

The Outcome-Expenditure Index Among California's Unified Districts

Unified districts with both high and low outcome-expenditure index scores are found throughout the state (see Figure 10), with some clustering geographically. One factor that we have not controlled for is size. Theoretically, larger districts would be able to share resources, such as a library, across students, and would therefore be able to have greater achievement given the amount of resources per student. Using our index, we find that for districts with fewer than 5,000 students, the index is positively correlated with size. For districts with more than 5,000 students, size does not seem to relate to a district's index. This may mean that these larger districts do benefit from the ability to share resources across larger numbers of students, but only to a point. Economists often refer to this phenomenon as decreasing returns to scale. The lower index scores that we find associated with smallness are especially noted in districts far from urban areas (see Figure 10). Variation in the outcome-expenditure index also appears to decrease with size.

Figure 10. Map of California unified districts by outcome-expenditure index, 4-year average of 2004-05 to 2008-09



Note: white areas indicate no unified district is present.

Conclusion

This study was designed to establish baseline information for the further exploration of what happens when a state like California, already at or near the bottom in terms of the education resources available to its students, experiences a substantial decline.

Based on data from the 2007-08 school year prior to the current fiscal crisis, California was already close to the bottom in terms of spending per student and at the very bottom in terms of some key education staffing resources. In addition, the learning challenges associated with California's students, with 32 percent designated as English learners (ELs), are arguably the highest of any state.

In establishing a resource allocation baseline prior to the financial decline, it seems important to more fully consider where California fits in regard to other states. We do not suggest California's low public investment is sufficient or that the state's student outcomes are acceptable. However, with among the very lowest public education investments in the nation and arguably the nation's most challenging students, California's educational outcomes appear more impressive.

If we view California's K-12 education system as quite "lean," producing positive student outcomes in light of the students available and resources available, the potential effects of unprecedented budget cuts seem of special concern. Enrolling one-eighth of the nation's students, California is an important test case for what happens when the state with the least resources currently available for education suddenly begins investing appreciably less. In a follow-up report, we will document what occurs in California districts and counties as resources substantially decline, based on interviews with local, county, and state education administrators. Over time, we plan to examine the trends in both achievement and school climate measures to gain a better understanding of possible impacts of the severely reduced public education services.

We will also extend our exploration of ways to consider the educational outcomes produced by school districts in light of the characteristics of the students they serve and the resources available to them. Specifically, we plan to study districts that appear especially effective in regard to producing much higher than predicted student outcomes with challenging student populations despite limited resources. Learning ways to be as effective as possible with fewer resources seems especially important now in these tough economic times and, as California may never spend as much on education as other states, for the foreseeable future.

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